

METHOD AND DEVICE FOR THE SEPARATE COLLECTION AND DRAINAGE OF FAECES AND URINE IN URINE SEPARATING TOILETS

DESCRIPTION

[0001] The method presented here relates to a urine separation toilet. Said toilet can be constructed without a partition wall between the urine and faecal outlets in such a way, that the whole bowl can be cleaned during flush operation and that the toilet paper in the urine outlet area, together with yellow deposits can be transported to the faecal outlet area. The toilet can nevertheless maintain a water-free disposal of urine.

[0002] State-of-the-art urine separating toilets are equipped with a partition wall between the front urine outlet and the back faecal outlet area, thus dividing the toilet bowl into two hydraulically unconnected partial-bowls, related to the two levels of the outlets.

[0003] If urine is diluted with water, urinary calculus precipitates, clogging the urine drainage pipes in the long run. Thus, the urine outlet has to be designed water-free. Consequently, state-of-the-art technology is limited to only flushing the back partial-bowl, because the front partial-bowl is not flushed.

[0004] Accordingly, the disadvantage of the state-of-art technology is that the front urine outlet area cannot be flushed, and thus the toilet paper, being disposed of in the front urine outlet mainly during women's urination, cannot be transported to the faecal outlet by means of flushing. It has to be transported manually, quite usually with the help of the toilet-brush, into the back faecal outlet area.

[0005] One other disadvantage of the state-of-art technology is that due to the water-less urine outlet, splashes of the urine dry-off upon the bowl-walls of the front urine outlet, thereby causing a yellow layer to develop in the course of time.

The first of these is the fact that the
 H^+ ions are not free to move in the
 solid, but are bound to the oxygen
 atoms. This is because the oxygen
 atoms have a high electronegativity,
 and the H^+ ions are attracted to
 them. This results in the formation
 of a network of hydrogen bonds,
 which holds the structure together.
 This network is responsible for the
 high melting point of ice, and for
 its unique properties as a solid.

[0006] One other disadvantage of the state-of-art technology is that the urine outlet is open, whereat a strong ammoniac odour develops especially in case of long time non-usage, which is caused by the activity by the bacterial enzyme urease settling in the urine outlet.

[0007] A French patent application proposes to equip the urine outlet with a close-able seal, whereat the urine outlet seal is opened during seating by a pressure sensor, which is coupled to the toilet seat. But this urine outlet is not water-free because during flushing, flushing-water always remains in the front bowl, which drains through the urine outlet during the next usage. Furthermore, the partition wall is equipped with a small hole through which excess flushing-water can run-off from the front urine outlet area into the faecal outlet area. Although the dilution of urine is little, it is sufficient for urinary calculus precipitation. As a result of this knowledge, the mechanics of a close-able urine outlet, which is coupled through a pressure sensor with the toilet seat, is presently known.

[0008] The described disadvantages of the state-of-art technologies are eliminated by means of the following the method according to the invention and its exemplary and/or preferred embodiments.

[0009] Very preferably, the device comprises:

- (1) a close-able urine outlet with a connected drainage pipe and/or siphon, whereat the siphon can be equipped with an odour retaining light liquid, and/or
- (2) one or more conceivable and/or actually on the market available mechanical and/or physical and/or chemical sensors, and/or
- (3) a designed V-shaped toilet bowl in the cross-section which can collect the urine in front of the urine outlet more concentrated. The cross-section preferably shows bulging protrusions, which guide the urine effectively to the urine outlet.

[0010] The advantage of this method is the simple control of the toilet by means of the employment of sensors. In an especially preferred embodiment, the very workings of the human

excretory process are employed in the control of the water-free urine outlet. In a especially preferred embodiment, this control method comprises the following steps:

- (a) A preferred embodiment comprises sensors, especially preferably pressure sensors, which cause direct and/or indirect reactions as soon as a person sits down on a toilet.
- (b) In another especially preferred embodiment, the reactions caused in (a) and/or (c) produce an opening in the urine outlet.
- (c) In another especially preferred embodiment, the reactions caused in (a) and/or (c) produce a closure, or a blocking of the push-button of the device for flushing the toilet bowl, or other suitable measures, to prevent a flushing process in the toilet bowl.
- (d) In another especially preferred embodiment, the said sensors in (a) cause preferably direct and/or indirect reactions as soon as a person rises from the toilet.
- (e) In another especially preferred embodiment, the reactions caused in (d) and/or (f) produce a closure of the urine outlet.
- (f) In another especially preferred embodiment, the reactions caused in (d) and/or (e) produce an opening, or a release of the push-button of the device for flushing the toilet bowl, or other suitable measures, to reverse the reactions in (c).

[0011] The said pressure sensors in (a) are preferably simple, mechanical gearing constructions. The following explains the control by means of pressure sensors and simple mechanical gearing constructions. But these gearing constructions can be supplemented or even replaced by other kinds of constructions, such as gas- or liquid- hydraulic, electric, electronical, etc.

[0012] In a state of rest, the urine outlet is closed tight, and the flushing push-button is activatable. It's activation leads to a flushing of the toilet.

[0013] Through weight (through taking a seat), the toilet seat is pressed down a small distance, and this distance leads to a lifting (opening) of the urine outlet seal via a gearing construction.

[0014] By releasing (through rising) the toilet seat, one or more devices for generating a counter-pressure against the weight-pressure, preferably a metal compression spring, press the seat and the urine outlet seal back to the state of rest.

[0015] Moreover, the device for generating the counter-pressure should close the urine outlet tightly, and should move the gearing construction preferably only after a certain threshold weight is applied. This threshold value should of course be very preferably lower of a sitting child.

[0016] The activation of the mechanical gearing construction should at the same time lead to a decoupling of the toilet-flushing mechanism, preferably here as well via a simple mechanical gearing construction.

[0017] For these mechanical constructions, all currently known methods and devices are usable.

[0018] The activation of the toilet flush-button can preferably suspend the functioning of the urine outlet, until the flushing procedure is completed. By this means, the entrance of the flushing water into the urine outlet during sitting and pushing the flush-button is prevented. Here as well, all currently known methods and devices known to the experts are usable for these mechanical constructions.

[0019] In the past decades, the behaviour of the male urinating clientele has changed slowly at the instigation of the female device users. A certain percentage of the male users has started to tip up the toilet seat ahead of excreting urine in the erect standing position. In another especially preferred embodiment, the here presented method takes advantage of this male behaviour concession. The tipping up of the toilet seat causes an opening of the urine outlet with a simultaneous blocking of the flushing device. By means of this, it is ensured, that at least a part

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of the urine of masculine standing urinals retrieved at the urine outlet. The tipping down of the toilet seat then causes the closure of the urine outlet and the release of the flushing device.

[0020] The faecal outlet can be designed for all possible embodiments, such as suction devices etc. For the operation of the flushing device, one or more push-buttons can be provided for, allocating different water amounts for the flushing procedure.

[0021] In a further especially preferred embodiment, said sensors in (2) can be utilized identifying and/or distinguishing substances which may be put into the toilet, such as urine, faeces, toilet paper etc. The reactions then caused by the sensors can regulate the water consumption of the toilet.

[0022] In a further especially preferred embodiment, the toilet bowls of said embodiments can be equipped with a dirt-, or water-rejecting surface (e.g. nano surfaces), preferably according to the "lotus-leaf principle".

[0023] The principle of the method shall now be explained by means of drawings which show the mechanics of the process. These exclusively exemplary embodiments shall only elucidate one possible variation of the method and the device according to the invention

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[0024] **Figure 1** shows a cross-section A – B through the toilet in a preferred embodiment of the device according to the invention. The mechanism is preferably located in the hatched part of the figure, which opens the urine outlet and decouples the toilet flushing mechanism during seating, and re-establishes the state of rest during release. (1) shows a cross-section through the faecal siphon. (6) shows the urine outlet with siphon. Sections 1 – 4 show the cross-sections of figure 2.

[0025] **Figure 2** shows the cross-sections of a preferred embodiment of the device according to the invention.

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[0026] Section 1 shows a section through the upper part of the device. Cutting edge A – B shows the cut of figure 1. (2) symbolizes the urine outlet, and (3) the faecal outlet.

[0027] Section 2 shows bulging protrusions (3) and (4) of the lateral walls of the device, serving to guide the urine into the urine outlet.

[0028] Section 3 shows even greater bulging protrusions.

[0029] Section 4 shows the protrusions shortly just in front of the urine outlet, which is located deeper. Located deeper than the urine outlet is the flow-off edge of the faecal outlet.

[0030] Figure 3 shows a possible mechanical control in a preferred embodiment of the device according to the invention. Black circles symbolise axles, white circles symbolise joints. (E) symbolises the tipped up toilet seat covering the flush-button (D).

The weight on the toilet seat

[0031] Weighting the toilet seat (A), it presses via pressure-head (2) on sensor (3). This in turn presses bar (4) to the joint (5) down.

[0032] Therefore, the stiff bar (6) – (8), which revolves mounted on an axle (7), is pressed down at the end (6), and thus the end (8) is pressed up.

[0033] This forces bars (10) and (15), being mounted along with joints (9) and (14) to bar (8), to rise upward.

[0034] This causes a lifting of the urine outlet seal (B) inclusive of cover (C). Thereby, the urine outlet is open. At the same time, blocking-plug (11) snaps into the blocking-hole (12) of the blocking-shutter (13).

[0035] Also at the same time, blocking-shutter (16) is forced upwards via bar (15), which is mounted with joint (14) to bar (8). Thereby, the flush-button (D) is blocked twice with blocking-plug (18) and blocking-shutter (16), by means of bars (17), (19), (21) and (23).

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Release of the toilet seat

[0036] Spring (26) presses the entire mechanism back into a state of rest; the urine outlet seal (B) thus sinks down and closes the urine outlet, and the toilet flushing is released via a sinking of blocking-plug (11) and blocking-shutter (16).

Pressing the flush-button with a released toilet seat

[0037] Pressing flush-button (D) causes via bar (17) a snap of blocking-plug (18) into blocking-hole (16a) of blocking-shutter (16).

[0038] At the same time, the stiff bar (19) – (21), revolving mounted on axle (20), is now forced backwards at the joint (18).

[0039] Therefore blocking-shutter (13) moves via bar (23) forward, which is mounted via joint (22) to bar (21).

[0040] Thereby, the urine outlet is blocked twice via blocking-plug (11), which cannot snap into blocking-hole (12), and via blocking-shutter (16) (by means of (10), (8) and (15)), which is fixed through the locked blocking-plug (18).

[0041] Flush-button (D) moves backward only if the flushing procedure is finished. Thereby, an opening of the urine outlet seal is also excluded, provided that the toilet seat (A) is sat on during flushing.

Tipping up of the toilet seat

[0042] Toilet seat (A) revolves mounted on axle (1) via fixed bearing (25). Tackle (24) is fixed mounted on bearing (25) and bar (8). Tipping up the toilet seat (A) causes a turn to the right of bearing (25) around axle (1). Thereby tackle (24) draws bar (8) upwards, and the urine outlet seal lifts, and the toilet flushing is blocked. After tipping down the toilet seat (A), spring (26) forces the mechanism back to the state of rest.

[0043] Detail A shows details of both blocking mechanisms. Blocking-plugs (11) and (18) can snap into the blocking-holes (16a) and (12). Thereby, both blocking-shutters (13) and (16) become immovable. After the snapping out of blocking-plugs (10) and (17), both blocking-shutters (13) and (16) become movable upward again along their grooves (12a), in which axles (10) and (17) stick.

[illegible]